Notice of Allowability	Application No.	Applicant(s)	
	10/771,613	STAGER ET AL.	
	Examiner	Art Unit	
	Dieu-Minh Le	2114	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *the interview on 7/14/07 and the communication filed on 7/19/07*.

2. ☒ The allowed claim(s) is/are *1, 4-7, 12, 14-21, 23-39 [now as 1-31]*.

3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
   a) ☐ All b) ☐ Some* c) ☐ None of the:
      1. ☐ Certified copies of the priority documents have been received.
      2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
      3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
      1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
   (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date 7/19/07
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application
6. ☒ Interview Summary (PTO-413), Paper No./Mail Date _____ .
7. ☒ Examiner's Amendment/Comment
8. ☐ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

DIEU-MINH LE
PRIMARY EXAMINER

1. This office action is in response to the interview on 9/14/2007 and the communication filed on 07/19/07 in application 10/771,613.

2. Claims 1, 4-7, 12, 14-21, 23-39 [now as 1-32] are allowable over the prior art of record; claims [2-3, 8-11, 13, and 22] have been cancelled.

3. An Examiner's Amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 C.F.R. § 1.312. To ensure consideration of such an amendment, it **MUST** be submitted no later than the payment of the Issue Fee.

EXAMINER'S AMENDMENT:

IN THE CLAIMS:

Please replace all prior versions of claims in the application with the current listing claims in the **ATTACHMENT:**

4. Authorization for this Examiner's Amendment was given in a telephone interview with Mr. Steven J. Gelman, Registration No. 41,034 on 09/14/2007.

Any comments considered necessary by applicant must be submitted no later than the payment of the Issue Fee and, to avoid processing delays, should preferably **accompany** the Issue Fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dieu-Minh Le whose telephone number is (571) 272-3660. The examiner can normally be reached on Monday - Thursday from 8:30 AM to 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Scott Baderman can be reached on (571)272-3644. The Tech Center 2100 phone number is (571) 272-2100.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

DIEU-MINH THAI LE
PRIMARY EXAMINER
ART UNIT 2114

DML.
09/19/2007

ATTACHMENT:

LISTING OF CLAIMS:

1. (Previously presented) A method for providing continuous data protection, the method comprising the steps of:

duplicating a sequence of writes made to a primary volume to a secondary volume, the sequence of writes to the secondary volume being in a sequential order based on a time of a write to the primary volume;

mapping the writes between the primary volume and the secondary volume; and

organizing the mapping of the writes into mapping data structures wherein the structures enable the primary volume to be rewound to any point in time, thereby enabling changes to the primary volume to be tracked between any two points in time.

2. - 3. (Canceled)

4. (Previously presented) The method of claim 1 wherein a mapping data structure is used to selectively play back portions of the secondary volume.

5. (Original) The method of claim 1 further comprising the step of merging mapping data structures together to create a new volume that is identical to the primary volume at a previous point in time.

6. (Original) The method of claim 1 further comprising the step of merging mapping data structures that have the same expiration policy to enhance system performance.

7. (Original) The method of claim 1 further comprising the step of fading out data by merging the mapping data structures thereby freeing up blocks that are no longer used.

8. - 11. (Canceled)

12. (Currently amended) A system for providing continuous data protection, the system comprising:

a host computer;

a primary volume for storing a sequence of data written by the host computer;

a secondary volume wherein the sequence of writes made to the primary volume are duplicated on the secondary volume, the sequence writes to the secondary volume being in a sequential order based on a time of a write to the primary volume; and

a continuous data protection system configured to manage the duplication of writes to the secondary volume and to map data between the primary volume and the secondary volume using a mapping data ~~structures~~ structure, wherein the mapping data structure is configured to track changes to said primary volume between any two points in time.

13. (Canceled)

14. (Previously presented) The system of claim 12 further comprising a volume manager for mirroring writes to the primary volume and the secondary volume.

15. (Original) The system of claim 14 wherein the volume manager is a software module running on an intelligent storage switch.

16. (Original) The system of claim 14 wherein the volume manager is a software module running on a server.

17. (Previously presented) The method of claim 1, wherein the mapping data structures are delta maps.

18. (Previously presented) The method of claim 1, wherein the sequential order on the secondary volume is sequential in time.

19. (Previously presented) The method of claim 1, wherein the sequential order on the secondary volume is sequential with respect to a storage location on the secondary volume.

20. (Previously presented) The system of claim 12, wherein the sequential order on said secondary volume is sequential in time.

21. (Previously presented) The system of claim 12, wherein the sequential order on said secondary volume is sequential with respect to a storage location on said secondary volume.

22. (Canceled)

23. (Previously presented) The system of claim 12, wherein a mapping data structure is used to selectively play back portions of said secondary volume.

24. (Previously presented) The system of claim 12, wherein said continuous data protection system is further configured to merge mapping data structures together to create a new volume that is identical to said primary volume at a previous point in time.

25. (Previously presented) The system of claim 12, wherein said continuous data protection system is further configured to merge mapping data structures that have the same expiration policy to enhance system performance.

26. (Previously presented) The system of claim 12, wherein said continuous data protection system is further configured to fade out data by merging the mapping data structures, thereby freeing up blocks that are no longer used.

27. (Previously presented) The system of claim 12, wherein the mapping data structures are delta maps.

28. (Previously presented) A method for continuously protecting data on a primary volume, comprising the steps of:

creating an initial snapshot of the primary volume, the initial snapshot located on a secondary volume;

duplicating a sequence of writes made to the primary volume to a write log on the secondary volume, the sequence of writes to the write log being in a sequential order based on a time of a write to the primary volume;

determining whether a snapshot has been triggered;

inserting a marker into the write log if a snapshot has been triggered; and

creating a mapping data structure from the write log, wherein the mapping data structure represents changes to the primary volume between two points in time, whereby the method continuously protects the primary volume from the time of the initial snapshot.

29. (Previously presented) The method of claim 28, wherein the sequential order on the secondary volume is sequential in time.

30. (Previously presented) The method of claim 28, wherein the sequential order on the secondary volume is sequential with respect to a storage location on the secondary volume.

31. (Previously presented) The method of claim 28, wherein the creating step includes converting the write log to a block-ordered mapping data structure.

32. (Previously presented) The method of claim 28, wherein the mapping data structure is used to play back portions of the write log.

33. (Previously presented) The method of claim 28, further comprising the step of:

periodically merging mapping data structures from a time of a previous snapshot to the current time, whereby the merging step optimizes the mapping data structures.

34. (Previously presented) The method of claim 33, wherein the merging step is performed according to a predetermined policy.

35. (Previously presented) The method of claim 33, wherein the merging step is performed after a predetermined number of writes to the primary volume.

36. (Previously presented) The method of claim 33, wherein the merging step is performed after a predetermined period of time.

37. (Previously presented) The method according to claim 33, wherein the merging step includes merging mapping data structures having the same retention policy.

38. (Previously presented) A computer-readable storage medium storing a set of instructions for execution by a general purpose computer to provide continuous data protection, the set of instructions comprising:

a duplicating code segment that duplicates a sequence of writes made to a primary volume to a secondary volume, the sequence of writes to the secondary volume being in a sequential order based on a time of a write to the primary volume;

a mapping code segment that maps the writes between the primary volume and the secondary volume; and

an organizing code segment that organizes the mapping of the writes into mapping data structures wherein the structures enable the primary volume to be rewound to any point in time, thereby providing continuous data protection to the primary volume.

39. (Previously presented) A computer-readable storage medium storing a set of instructions for execution by a general purpose computer to provide continuous data protection, the set of instructions comprising:

a first creating code segment that creates an initial snapshot of a primary volume, the initial snapshot located on a secondary volume;

a duplicating code segment that duplicates a sequence of writes made to the primary volume to a write log on the secondary volume, the sequence of writes to the write log being in a sequential order based on a time of a write to the primary volume;

a determining code segment that determines whether a snapshot has been triggered;

an inserting code segment that inserts a marker into the write log if a snapshot has been triggered; and

a second creating code segment that creates a mapping data structure from the write log, wherein the mapping data structure represents changes to the primary volume between two points in time, whereby the primary volume is continuously protected from the time of the initial snapshot.